# ESTABLISHING NORMS AND GRADES OFA TEST BATTERY FOR SEARCHING OF TALENTED SCHOOL LEVEL VOLLEYBALL PLAYERS

**Pawar Santosh[1] &Bera Tusharkanti[2]**

[1]Ph.D. Scholar, Bharati Vidyapeeth (Deemed to be University) College of Physical Education, Pune-43 (India).

[2]Principal & Professor, Bharati Vidyapeeth (Deemed to be University) College of Physical Education, Pune-43 (India).

**ABSTRACT**　　*Background: Literature reveals that many factors such as physiological, physical, technique, skills, tactics, body size, body composition etc. are associated to exhibit top performance in volleyball.In fact, no uniform selection process is available so far for selection of talented school level volleyball players.The present study, therefore, was conducted with a view to establish norms that can help to select standard volleyball players.*

*Materials and Method: A standard test battery consisting of 11test-itemsi.e., two morphological (height and weight), three performance related physical fitness (sit ups, vertical jump and pushups) and six skills (servicing, underhand pass, setting front pass, back pass, spiking, and blocking) was administered on a large number of elite male volleyball players (n=300), aged 13-15 yrs, who were selected from the schools located in five districts of western Maharashtra.*

*Results: The norms of the test battery have adequate objectivity with statistical acceptability, which are gradable and can discriminate talented school level volleyball players having a higher profile of physical fitness and skill.*

*Conclusion: The results show that the norms of the Test Battery can justifiably be applicable for searching talented school level volleyball players who, in turn, can constitute a standard volleyball team for the state of Maharashtra.*

*Keywords: Norms, Volleyball, Grades, School level players*

## Introduction

Volleyball is a competitive sport played on many different court surfaces depending on whether it is being conducted indoors or outdoors. For success in this game strength and muscle power of both upper and lower extremities as well as neuromuscular coordination and technical skills are essential elements (Smith Roberts & Watson, 1992).The performance of volleyball players is influenced by many factors such as physiological, physical, technique, tactics, body size, and body composition. Although the performance of a player is influenced by many factors but still physical fitness components of a specific game areconsidered as the primary factors (Lidor&Ziv, 2010).

In recent years, exhibition of poor performance at national and international levels by Indian sports person is of great concern. Even though efforts have been made to improve the standards of our sports persons, however, little success has so far been achieved. Performance in any sport at school, university, national, and international levelsprimarily depends upon the specific physical fitness and skills of that particular game, which is equally applicable in volleyball too. Several earlier studies have investigated the anthropometric and physiological characteristics of both teenage and adult volleyball players and their impact on volleyball performance (Gabbett&Georgieff, 2005; 2007; Fleck *et al.,* 1985; Thissen-Milder & Mayhew, 1991). Further, agility, strength, power, speed and balance are the key factors for the sport performance in the court sports like volleyball (Little & Williams 2005; Sheppard & Young 2006; Markovic, Sekulic& Markovic 2007; Sekulic*et al.,* 2013; Barnes *et al.,* 2007).

In fact, the level of competitions in volleyball has gone high to such an extent that simply when there is a selection trial for composing a school team (consisting of 12 players only), generally more than 100 players appear in selection trials. Dealing with such a large number of players in selection trials is not only a difficult job, but also may create a serious problem in dejecting efficient players from the team, since the selectors or a coaches did not have a scientific as well as reliable and valid criteria/norms on the basis of which the standard volleyball players are to be selected. Moreover, there is neither any uniform procedure in identifying players for school level volleyball nor the accurate selection procedure. Therefore, the present study was undertaken with a view to formulate norms for selection of school level volleyball players.

## Method

### Subjects

The subjectsof this study were male school level elite volleyball players, aged 13-15 years, belonging to Maharashtra. Although the population is vast and the surface area of Maharashtra state is very wide, the

jurisdiction of this study was delimited to the number of schools situated in the 5 districts (viz., *Pune, Sangli, Satara, Kolhapur and Solapur*) inWestern region of Maharashtra. Further, twenty schools from five districts (i.e., 4 schools from each district) were selected randomly. Total three hundred elite volleyball players(n=300) studying in schools volunteered in this study. Consent from physical directors/coaches/principals of the participated schools was obtained prior to start of this normative survey. Further, a written consent from each participant was also taken for ethical reasons.

## Assessment of variables

To search talented school level volleyball players, **a test battery** has already been developed (Pawar&Bera, 2018), but norms and grades were not available. The norms and grades of the battery have been developed in this study. The variables selected for this study were morphological, volleyball skills and performance related physical fitness. Total eleven testswere included for the formation of selection criteria. Morphological tests were *height and body weight,* whereas performance related physical fitness tests consist of *sit ups, vertical jump and pushups*. Further, the volleyball skills included in the present study were *servicing, underhand pass, setting front pass and back pass, spiking, and blocking.*

*Body height* of the subject was measured with the subject standing erect, without shoes, against a wall with marked scale. The subject was made to stand with heels together, buttocks and back touching the wall and head erect. He was then asked to hold a full breath and stand still, looking forward while the measurement was taken. A stiff, hard bond was held horizontally over their head and touching the scale marked. The subject was then asked to step out by lowering the head and the reading indicated by the lower end of the hard board was recorded to the nearest half of the centimeter.

*Body weight* of the subject was taken with the help of a portable weighing machine. The subjects were asked to wear only T-shirts and shorts and made to stand bare foot on the weighting machine and the reading was recorded to the nearest half kilogram.

To assess *service of volleyball* with accuracy, the equipment required were 10 balls and ball-trolley. 3 meter (3-point) line away from centre line was marked inside the court. One meter line (4-point) from the end line was marked, 3.28 meter (2-point) line was marked from sideline on both the sides so that the area of 3.28 meter on both right and left side line was made and 2.43 meter zone in the centre was prepared. The tester was standing on the other side of the court. The subjects were instructed to serve the volleyball, where ten services were allowed for each subject. Total number of points scored was recorded.

To evaluate*under arm pass* with accuracy the equipment required were volleyball, whistle, and stopwatch. The subject was asked to stand behind the three feet line. After the command "go" subject was asked to perform under arm pass on the given target on the wall which was marked 7.5 feet high. This drill was performed continuously for thirty seconds. The number of successful under arm pass in thirty seconds was recorded as score in point.

For s*etting front pass and back pass in volleyball, a* 4 meter inside from sideline on either side was marked near the centre line. Setter was asked to collect the ball form trolley. Firstly, setter was asked to perform self-toss with the ball and set the ball in the target area. The target was ring with 0.30 cm diameter which was placed in front as well as on back. Ten chances were provided i.e. five chances for front and five for back pass. Successful setting passes were counted in point for back as well as front.

*Spiking ability* was measured with accuracy with 15 volleyballs along with a ball trolley. Ground marking was done as above. The subject was instructed to perform spiking from three different zone of 3 meters. Self-spiking was performed in each zone. Points were recorded where the ball landed. Total number of points was the score.

Blocking ability was assessed with 10 volleyballs. Three meters area from each side line was marked. Blocker was asked to stand at centre of the net inside the area of 3 x 3 meter box from the other side of the court. Ten passes were provided for blocking. The number of successful block in ten spiking was counted as score.

## Procedure

To search talented school level volleyball players, a standard **test battery**(Pawar&Bera, 2018) was administered on 300 elite players for data collection. This test battery had 11 items as stated above. A time schedule was prepared, preferably at afternoon, for each school to administer the test items. The players were called 1 hour prior to actual testing programme. They were explained the detailed procedure to participate in each item and clarified their doubts, if any. According to the test items, 11 testing-booths were created (like a circuit training) on the playground where related instruments were placed with marking the ground, if requires. Each testing booth was controlled by 2 trained-technical-assistants for data collection.

## Statistical Analysis

The distribution of performance scores of each item were assessed with respect to a normal probability curve and norms were established. Normality of the scores was evaluated on the basis of the values of Skewness (Sk), Kurtosis (Ku) and their standard errors along with the percentage of distribution within the range of three standard deviations. After testing the normality of the item-wise performance scores of the subjects, the data were processed for calculation of Percentile norms. The scores of the subjects in the items of morphological, fitness, and volleyball skills were grouped together and divided into logical step-intervals for frequency distribution.  Measures of Central tendency and measures of variability were calculated using standard statistical procedures from the distributed frequency of the data. Finally, percentile norms were found out using group data. The mid-point of each step was calculated and arranged. The item-wise normative data were graded on the basis of the principles of Likert's Five point scale (Gullford&Fruchter, 1973).

## Results

The results on percentile norms have been presented in Tables 1 & 2, which can be interpreted easily in terms of an example: if a volleyball player exhibits a body height of 179.50 in morphological measurement, the raw score will be 179.50 centimeters. Now see Table 1 and find raw score (i.e., 179.50) is residing under the step ranged from 179.18-179.92. Consider the lowest step i.e. 179.18 under the percentile score 85. Thus, the percentile score of the person is 85 which are designed as the standard or normalized scores of the player's standard body height. Table 1 also demonstrated that in a percentile norms, the $P_{99}$ and the $P_0$ values of the Body height were '182.00 & above' and '166.02' & below respectively. Likewise, norms of all other variables are to be evaluated.

The grading followed by percentile method was derived for the subjects in each item using principle of Likert's five point scale (Verducci, 1980). The percentile norms, presented in Table 1&2, were further substantiated to find out the grade of performance in the Test Battery in favour of selection of talented volleyball players. In fact, a percentile score indicates the percent of individuals who fall below a specific score, whereas the grading signifies the performance ability within a range of scores. The derivation of grade in the test-items has been presented in Table 3. The raw score achieved in each event can be well interpreted easily so that an individual's performance in each event is either excellent or good or average or fair or poor can easily be determined for selection of a talent player in volleyball.

Table 4 represents the overall performance-grade in volleyball as expressed on the basis of the overall percentile norms. The addition of percentile scores, as secured from the raw score of each item, represents the overall percentile norms.

**Table 1**
**Norms based on raw score for selected morphological and fitness variables**

| Percentile Norms | Height (Cm) | Weight (Kg) | Sit-ups (No./min) | Vertical jump (No.) | Pushups (No./min) |
|---|---|---|---|---|---|
| 99 | 182.00 & above | 64.11 | 46.30 & above | 57.14 & above | 46.68 & above |
| 95 | 180.97 | 63.16 | 45.93 | 55.23 | 45.97 |
| 90 | 179.92 | 61.19 | 43.53 | 53.96 | 44.78 |
| 85 | 179.18 | 60.51 | 41.69 | 52.28 | 43.44 |
| 80 | 178.60 | 59.97 | 40.76 | 50.90 | 42.12 |
| 75 | 178.07 | 59.24 | 39.93 | 49.83 | 41.18 |
| 70 | 177.48 | 58.94 | 39.27 | 48.79 | 40.89 |
| 65 | 176.82 | 58.01 | 38.71 | 47.34 | 39.93 |
| 60 | 175.94 | 57.67 | 38.23 | 46.05 | 38.10 |
| 55 | 175.17 | 56.89 | 37.71 | 45.16 | 37.63 |
| **50** | 174.04 | 55.17 | 37.10 | 44.67 | 36.67 |
| 45 | 173.64 | 54.88 | 36.45 | 43.37 | 35.84 |
| 40 | 172.79 | 54.04 | 35.71 | 42.09 | 34.54 |
| 35 | 171.94 | 53.47 | 34.93 | 40.88 | 33.23 |
| 30 | 170.89 | 52.97 | 34.27 | 39.85 | 32.89 |
| 25 | 170.00 | 52.19 | 33.55 | 38.38 | 31.38 |
| 20 | 169.35 | 51.34 | 32.65 | 36.93 | 30.81 |
| 15 | 168.62 | 50.69 | 31.38 | 35.82 | 29.02 |

| 10 | 167.70 | 49.90 | 30.28 | 33.99 | 28.79 |
| 05 | 166.02 & below | 48.62 & above | 28.89 & below | 32.47 & below | 27.51 & below |

**Table 2**
**Norms for volleyball skills tests**

| Percentile Norms | Under hand pass | Front pass | Back pass | Service | Spiking | Blocking |
|---|---|---|---|---|---|---|
| 99 | 36.00 & above | 8.0 & above | 5.00 & above | 38.70 & above | 32.13 & above | 9.17 & above |
| 95 | 35.05 | 7.74 | 4.72 | 37.45 | 31.28 | 8.52 |
| 90 | 34.10 | 7.36 | 4.48 | 36.38 | 30.73 | 7.95 |
| 85 | 33.45 | 6.89 | 4.05 | 35.90 | 29.72 | 7.28 |
| 80 | 32.85 | 6.64 | 3.78 | 35.10 | 28.86 | 6.85 |
| 75 | 31.35 | 6.41 | 3.55 | 34.26 | 27.95 | 6.40 |
| 70 | 30.80 | 6.15 | 3.39 | 33.72 | 27.13 | 5.90 |
| 65 | 29.20 | 5.93 | 3.17 | 32.48 | 26.60 | 5.50 |
| 60 | 28.45 | 5.66 | 2.93 | 31.66 | 26.04 | 5.15 |
| 55 | 28.35 | 5.56 | 2.74 | 30.78 | 25.75 | 4.84 |
| **50** | **27.55** | **5.03** | **2.52** | **30.05** | **25.04** | **4.70** |
| 45 | 25.45 | 5.20 | 2.37 | 29.10 | 24.96 | 4.02 |
| 40 | 24.80 | 5.00 | 2.05 | 28.08 | 24.45 | 3.75 |
| 35 | 24.25 | 4.79 | 1.93 | 27.27 | 23.96 | 3.48 |
| 30 | 23.60 | 4.54 | 1.72 | 26.78 | 23.18 | 3.20 |
| 25 | 22.85 | 4.30 | 1.55 | 26.02 | 22.69 | 2.91 |
| 20 | 22.10 | 4.04 | 1.38 | 25.04 | 22.14 | 2.54 |
| 15 | 21.45 | 3.63 | 1.20 | 24.10 | 21.81 | 2.17 |
| 10 | 20.65 | 3.01 | 1.15 | 23.16 | 21.39 | 1.71 |
| 05 | 19.61 & below | 2.08 & below | 1.00 & below | 22.35 & below | 20.66 & below | 1.20 & below |

**Table 3**
**Grading scale on item-wise performance for selection of school level volleyball players**

| Test-Items | RAW SCORES | | | | |
|---|---|---|---|---|---|
| | Poor | Fair | Average | Good | Excellent |
| Height (Cm.) | 166 & below | 167-169 | 170-177 | 178-181 | 182 & above |
| Weight (Kg.) | 66 & above | 63-65 | 57-62 | 51-56 | 48 -50 |
| Under hand pass(points) | 19 & below | 20-23 | 24-31 | 32-35 | 36 & above |
| Setting front pass (points) | 2 & below | 3-4 | 5-6 | 7-8 | 9 & above |
| Back pass (points) | Below 1 pt. | 1-2 | 2-3 | 3-4 | 5 & above |
| Servicing (points) | 22 & below | 23-26 | 27-33 | 34-37 | 38 & above |
| Spiking (points) | 20 & below | 21-23 | 24-27 | 28-31 | 32 & above |
| Blocking (points) | 1 & below | 2-3 | 4-6 | 7-8 | 9 & above |
| Sit ups (No./min) | 28 & below | 29-33 | 34-39 | 40-45 | 46 & above |
| Vertical jump (Cm.) | 32 & below | 33-39 | 40-49 | 50-56 | 57 & above |
| Push ups (No./min) | 27 & below | 28-33 | 34-40 | 41-45 | 46 & above |

**Table 4**
**Grading scale of overall performance of volleyball players based on the Percentile Norms**

| Grades | Total Percentile Scores |
|---|---|
| Excellent (A) | 1089 & Above |
| Good (B) | 751-1088 |
| Average (C) | 326-750 |
| Fair (D) | 111-325 |
| Poor (E) | 110 & Below |

## Discussion

Volleyball is a popular game worldwide and even in India. Many competitions are organized for this game and ample of players including the school level volleyball players also participate. Today search of talented volleyball players at school level is a problem that needs investigation (Gabbett and Georgieff, 2006; Lidor*et al.,* 2007). There is no standard (research based) "criteria" available so far for discriminating talented school level Indian volleyball players. This study, therefore, is more significant in today's need.

Based on critical reviews of related literature (Lidor*et al.,* 2007; Marques *et al.,* 2009; Smith, Roberts and Watson,1992) and long-standing experience, present researcher formed a "Selection criteria" with 3 major dimensions viz., *morphological characteristics, performance related fitness and volleyball skills*which are thought to be essential requirement in exhibiting excellent performance in volleyball. Many experts of this game and sports scientists express agreement on all these dimensions (Melrose *et al.,* 2007; Sheppard, Gabbett and Stanganelli, 2009). Considering practical efficiencies, as needed in this game and on the basis of item analysis and factor analysis, total 11 test-items representing all these 3 dimensions were finally included in the "test battery."

The results of the norms on body height as appeared in this study revealed that talented volleyball players possessed a good length of body which may be good indicator for the selection in a standard volleyball team (Gabbett*et al.,* 2006). Since a good physical structure and proportional body weight play important role in any team game, the body height and proportional weight seem to be one of the essential requirements in volleyball. Thus, the norms of body height and weight will help to discriminate a standard volleyball player. The same proportion of body height and weight revealed in this study was suggested by Thissen-Milder and Mayhew (1991). Thus, the norms of body height and weight seem to be justified to select a standard volleyball player.

Along with the above results, the result of norms on three items viz., sit ups, vertical jump and push-ups revealed as significant indicators of performance related physical fitness as required by talented volleyball players. This result has been supported by earlier investigators (Paz, Gabbett, Maia, Santana and Miranda Lima, 2016). Thus, inclusion of sit ups, vertical jump and push up and their norms in the "test battery" seems to be logical.

Moreover, the norms of performances in volleyball skills viz., underhand pass, setting front pass, back pass, servicing, spiking, and blocking were found significant in exhibiting excellent ability in volleyball and appearance such results is in agreement with the results of many other previous investigations (Gabbett*et al.,* 2006; Gabbett and Georgieff, 2006; Marques *et al.,* 2009). The results as obtained in the present investigation indicate that the norms of six skills viz., underhand pass, setting front pass, back pass, servicing, spiking, and blocking got significant place for selection of talented volleyball players.

Finally, the test battery that includes selected morphological as well as fitness variables and skills can justifiably be administered and their norms are to implemented for searching talented school level volleyball players in the state of Maharashtra.

## Conclusion

The norms of the test batteryhave adequate objectivity with statistical acceptability and are gradable to discriminate talented high profileschool level volleyball players. The contents of the volleyball Test Battery and their norms can be used as criteria for selection of talented school level volleyball players to compose a standard State level school-volleyball-team.

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